

## PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN AND RELATING TO  
 PERMANENTLY CONNECTING TOGETHER MACHINE  
 PARTS IN CONCENTRIC ARRANGEMENT

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 land, do hereby declare the invention, for  
 which we pray that a patent may be granted  
 to us, and the method by which it is to be  
 performed, to be particularly described in and  
 15 by the following statement:—

This invention relates to a method of per-  
 manently connecting together machine parts  
 in coaxial arrangement, for example a gear-  
 wheel and clutch plate of a synchronised motor  
 20 vehicle change-speed gear, by resistance pres-  
 sure-welding.

The present invention consists in a method  
 of permanently connecting together machine  
 parts in coaxial arrangement by resistance-  
 pressure welding, characterised in that the two  
 25 parts to be welded are each provided with at  
 least one annular groove extending axially or  
 substantially axially of said parts, each groove  
 being of such a shape and so situated that  
 30 two annular lugs are formed which abut  
 axially against one another and form a weld  
 joint and which have a substantially constant  
 wall thickness.

The relatively small cross-section of the  
 35 annular lugs causes heat to accumulate at the  
 weld. The welding power is thereby reduced  
 and less distortion results. The elasticity of  
 the weld is increased.

In order that the invention may be more  
 40 readily understood, reference is made to the  
 accompanying drawings which illustrate  
 diagrammatically and by way of example, two  
 embodiments thereof, and in which:—

Figure 1 shows a half-view in cross-section  
 45 of a gear-wheel and a dog ring provided with  
 [Price 25p]

a synchronising cone, with two recesses of  
 rectangular cross-section before commence-  
 ment of the welding,

Figure 2 shows the same view after the  
 welding,

Figure 3 is a view similar to that of Figure  
 1, showing a gearwheel provided with a syn-  
 chronising cone and a dog ring, one annular  
 end face of which abuts against an annular  
 55 shoulder formed on the gearwheel,

Figure 4 shows the arrangement according  
 to Figure 3 on completion of the welding.

In Figure 1, reference numeral 1 designates  
 a gearwheel having an axis of rotation 2, and  
 which is to be welded to a dog ring 3 provided  
 with clutch dogs 4 and a synchronising ring  
 5. The gearwheel 1 has an axially extending  
 recess 6 and the dog ring 3 a likewise axially  
 extending recess 7. Both recesses 6 and 7  
 are of rectangular cross-section. The gearwheel  
 1 is provided with a shoulder 8 the contour  
 of which before the formation of the recess  
 6 is shown in dot-and-dash lines. The dog ring  
 3 has a shoulder 9 the contour of which before  
 the formation of the recess 7 is likewise shown  
 in dot-and-dash lines. By virtue of the recess-  
 ing an annular lug 10 and 11 is respectively  
 formed on the two parts 1 and 3 to be welded  
 together. The two annular lugs 10 and 11  
 abut against one another with their two end  
 75 faces and form the welding joint 12.

In an embodiment of a resistance-pressure  
 welding apparatus (not shown), the parts 1  
 and 3 are clamped in position co-axially with  
 the axis 2 and connected in the welding cir-  
 80 cuit, which is closed by the welding joint  
 12. During the welding the parts 1 and 3  
 are moved towards one another in the direc-  
 tion of the axis 2 until the two mutually  
 facing end faces 1' and 13 respectively of the  
 gearwheel 1 and the dog ring 3 contact one  
 another. This position of the parts 1 and 3  
 in the welded condition is shown in Figure 2.  
 The welding seam 12' is marked by cross-  
 hatching. The comparatively thin annular lugs  
 90

10 and 11 cause heat to accumulate at the joint during the welding, thus providing the advantages described in the introduction of the present specification.

5 Figure 3 shows a dog ring 21 which is provided with clutch dogs 20 and an end face 31 and which is to be welded to a gearwheel 22. The latter has a synchronising cone 23 and a shoulder 24 which at 25 and 26 is  
10 recessed in the axial direction. The contour of the shoulder 24 existing before the recessing is completed in dot-and-dash lines. The dog ring 21 is provided with an axially directed recess 27. The recesses form comparatively thin annular parts 28 and 29 respectively in the dog ring 21 and in the shoulder  
15 24 on the gearwheel 22, and these annular parts abut against one another at 30 and form the weld joint. Figure 4 shows the completed welded connection with the weld 30.

20 The cross-section of the recesses 6, 7, 25, 26 and 27 may have a different shape from the rectangular, for example trapezoidal, in which case the side surface of the trapezium remote from the annular part 10 or 11, 28, 29 is  
25 inclined in relation to the opposite side which is parallel to the axis 2.

#### WHAT WE CLAIM IS:—

30 1. A method of permanently connecting together machine parts in coaxial arrangement by resistance-pressure welding, characterised in that the two parts to be welded are each provided with at least one annular groove extending axially or substantially axially of

said parts, each groove being of such a shape and so situated that two annular lugs are formed which abut axially against one another and form a weld joint and which have a substantially constant wall thickness.

2. A method as claimed in claim 1, wherein the grooves are formed in an annular shoulder of one part to be welded and in an annular shoulder of the other part to be welded.

3. A method as claimed in claim 1, wherein one part to be welded has an axial groove and the other part to be welded has two axial grooves, said one groove being formed in an end face of said one part to be welded and one of said two grooves is formed in an annular shoulder and the other of said two grooves in an end face of the other part to be welded.

4. A method of permanently connecting together machine parts, in coaxial arrangement by resistance-pressure welding substantially as herein described with reference to Figures 1 and 2 or 3 and 4 of the accompanying drawings.

5. Two parts whenever permanently connected together by the method claimed in any one of the preceding claims.

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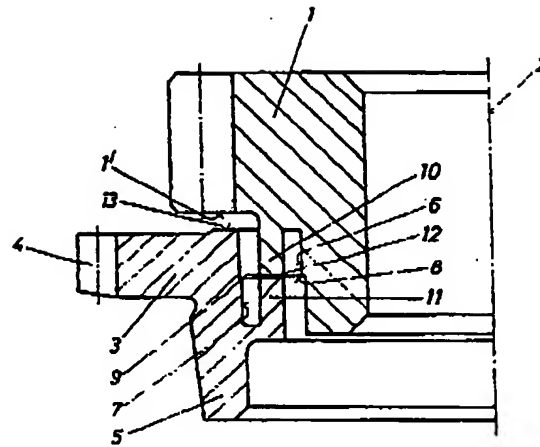
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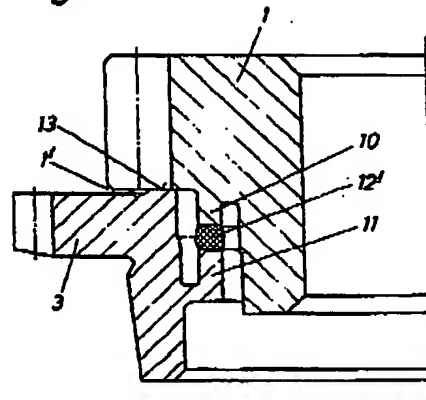
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Sheet 1

**Fig. 1**



**Fig. 2**



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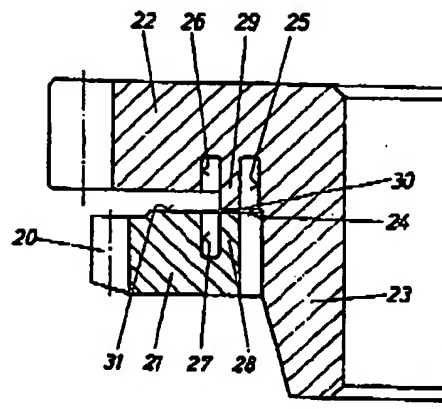
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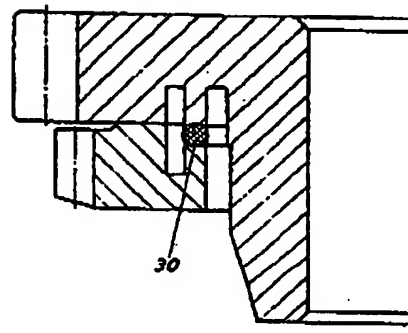
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Sheet 2

**Fig. 3**



**Fig. 4**



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